

ART. XIV.—*On the Generic Position of "Asterolepis ornata, var. australis," McCoy: with Description of a New Variety.*

BY FREDERICK CHAPMAN, A.L.S., &c.  
(Palaeontologist to the National Museum, Melbourne.)

(With Plates XX. and XXI.).

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**Introductory Note.**

The holotype of the above species and another specimen, practically a surface impression, were the only known examples when McCoy published his description in 1876.<sup>1</sup> Since then W. H. Ferguson, of the Geological Survey of Victoria, discovered a cranial shield at the same locality, Buchan, in Gippsland. This latter specimen I showed to Mr. D. M. S. Watson during his visit to Melbourne with the British Association last year, and he concurred with me in the view that the fish showed coccostean affinities. Comparison has also been made with some good examples in the National Museum of the Canadian species of *Phlyctacnaspis*, the genus to which I refer this Devonian fish.

*Original Description.*—The following is McCoy's description of the holotype. "Plates of body covered with close stellated tuberculations; tubercles rounded, sub-equal, smooth, each with about 12 short radiating ridges nearly equally spaced round its base, irregularly placed, averaging less than their diameter apart, rarely arranged more closely in lines, and rarely anastomosing into short vermicular ridges. Average number of tubercles, 5 in 3 lines. Interstices between the tubercles, granulo-punctate. Thickness of plates about 2 lines."

Neither the presence or disposition of sutures and sensory canals were mentioned by McCoy, although traces of the latter are well marked in the holotype and accompanying specimen. The feature of the stellate tubercular ornament of the dermal armour seems alone to have been relied upon for determinative purposes. This form of ornament of the dermal shield is, however, found both in the *Asterolepidae* and the *Coccosteidae*; hence the discovery of a more perfect specimen from Buchan showing the coccostean

<sup>1</sup> Prod. Pal. Victoria, dec. iv., p. 19, pl. xxxv., figs. 7, 7a, 7b. [Figure reversed].

arrangement of the elements of the cranial shield necessitates the removal of this interesting Australian Devonian type of fish to the latter family.

*Generic and Specific Relationships.*—The Australian specimens agree with *Phlyctaenaspis* (Traquair, 1890) rather than with *Cocco-steus*, in the more ovate form of the cranial shield, and in the fusion of the separate elements with the exception of the ethmoidal. Traquair has shown<sup>1</sup> that the notch in the external angle of the cranial shield in *Phlyctaenaspis* was occupied by a small plate, which he terms the angular, and which is absent in *Cocco-steus*; the remains of this plate are seen on the left side of the Buchan specimen of the variety *confertituberculata*, here described.

The Victorian specimens agree more closely with the Canadian species *Phlyctaenaspis acadica*, Whiteaves sp., than with the English, *P. anglica*, Traquair, in having the tuberculation somewhat regularly arranged in concentric lines parallel to the margin of the plates.

*Additional Description of Phlyctaenaspis australis, McCoy sp.*

The figured specimen (loc. cit., pl. XXXV., fig. 7) of McCoy shows definite sensory canals, and under a lens the sutures can be partly deciphered. The latter present some difficulty as they are closely fused. The disposition of these lines shows that the specimen consists of nearly two-thirds of the cranial shield in the anterior portion, the fracture of the posterior margin representing the anterior border of the left external occipital, the posterior of the central plates, and a part of the anterior of the median occipital; the fractured margin then cuts longitudinally through the right marginal, along the sensory canal, emerging about the middle of the plate (see pl. XX., fig. 3). The sutures and sensory canals are disposed, so far as they are visible, exactly as in *Phlyctaenaspis*.

*Measurements.*—The actual width of the holotype of *Phlyctaenaspis australis* is 55 mm., and the greatest length, 35.5 mm. The cranial shield, when complete, would approximately measure 55.25 mm. in length.

*Description of Phlyctaenaspis australis, var. confertituberculata, nov.*

In this variety the tuberculate ornament is very dense, and the tubercles smaller and more prominent. They are, moreover,

<sup>1</sup> Ann. Mag. Nat. Hist., ser. vi., vol. xiv., 1894, p. 369, woodcut.

arranged in a sub-parallel manner along the outer margins of the shield, and in places along the sutures of the inner area, this resulting in a particularly striking and ornate appearance.

The specimens consist of the larger part of the cranial shield, only the anterior portion, comprising the orbital plates and parts of the marginal plates, being wanting. The sutures, where visible, are much the same in form and direction as in *Phlyctaenaspis acadica*, Whiteaves sp.,<sup>1</sup> with the exception that the sensory canals traversing the external occipital plate from its outer posterior angles extend farther into the cranial shield before meeting with that coming down from the marginals.

The tuberculation in *P. acadica*, whilst showing the same microscopic characters, is much less dense than in either the Australian species or variety.

*Measurements*.—The type of *P. australis*, var. *confertituberculata*, has a total length of 59.25 mm. Its approximate width, measured from the traces of the marginal plates, is about 69 mm. The width inside the marginal plates is 47 mm.

#### *Distribution of Phlyctaenaspis.*

In his paper descriptive of *Phlyctaenaspis*, Dr. Traquair records<sup>2</sup> two species of the genus, viz.—

*P. acadica*. Whiteaves sp., from the Lower Devonian of Canada; and *P. anglica*, Traquair, from the Cornstones (Lower Old Red Sandstone) of Herefordshire.

Dr. A. S. Woodward records<sup>3</sup> an undetermined species of *Phlyctaenaspis* (recorded as *Cocosteus* by Alth) from the Lower Devonian of Russian Poland.

To this we now add *P. australis*, McCoy, and the variety *confertituberculata*, nov., from the Middle Devonian of Buchan, Gippsland, Victoria.

From the above data we may infer that this genus made its appearance in the Australian region at a later stage of the Devonian than in Canada and England.

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<sup>1</sup> *Cocosteus acadicus*. Canadian Naturalist (n.s.), vol. x., 1881, p. 94, woodcut. Whiteaves. Trans. R. Soc. Canada, vol. vi., sect. iv., p. 93, woodcut, fig. 2, pl. ix. *Phlyctaenaspis acadica*, Whiteaves sp., Traquair, Geol. Mag., vol. vii., 1890, p. 55, pl. iii., figs. 1, 2. Idem, Annals Mag. Nat. Hist., ser. vi., vol. xiv., 1894, p. 369 and woodcut.

<sup>2</sup> Geol. Mag., vol. vii., 1890, p. 60.

<sup>3</sup> Cat. Foss. Fishes, Brit. Mus., pt. ii., 1891, p. 299.

*Structure and Condition of the Rock in which Phlyctaenaspis australis was embedded.*

The holotype described by McCoy, and the accompanying specimen, was found in a pale chocolate-coloured, fine-grained mudstone. The only other organic remains to be seen in these hand specimens are fragments and impressions of the common Middle Devonian *Spirifer*, *S. yassensis* (= *S. laevicostata*, McCoy, non Valenciennes).

The variety, *confertituberculata*, occurs on a weathered surface of hard, nearly black bituminous limestone full of the remains of *Spirifer yassensis*; a low power shows the matrix to contain numbers of small ostracoda, probably belonging to the genus *Primitia*.

Ostracoda seem to have formed part of the food supply of these early palaeozoic fishes, and it is interesting to notice in this respect that the rock in which the National Museum specimens of *Phlyctaenaspis acadica* are found, literally swarms with several genera of ostracoda, including ?*Kloedenella* and ?*Leperditia*.

*Phlyctaenaspis* was evidently more at home in the muddy Devonian sea with its accompanying crustacean and brachiopod life than in the clearer waters where the coral fauna existed.

## EXPLANATION OF PLATES.

### PLATE XX.

- Fig. 1.—*Phlyctaenaspis australis*, McCoy sp. Holotype of "*Asterolepis ornata*, var. *australis*," McCoy. Middle Devonian. Buchan, Gippsland, Victoria. Cir. nat. size.
- Fig. 2.—*Phlyctaenaspis australis*, McCoy sp. Specimen showing a natural impression of the tuberculated plates of the cranial shield. Middle Devonian. Buchan, Gippsland. Cir. nat. size.
- Fig. 3.—Diagram of plates of cranial shield of *Phlyctaenaspis anglica*, Traquair; with outline of holotype of *P. australis* (shaded) to show relative area.
- Fig. 4.—*Phlyctaenaspis australis*, McCoy, var. *confertituberculata*, var. nov. An almost complete cranial shield. Middle Devonian. Buchan, Gippsland. Cir. nat. size.

